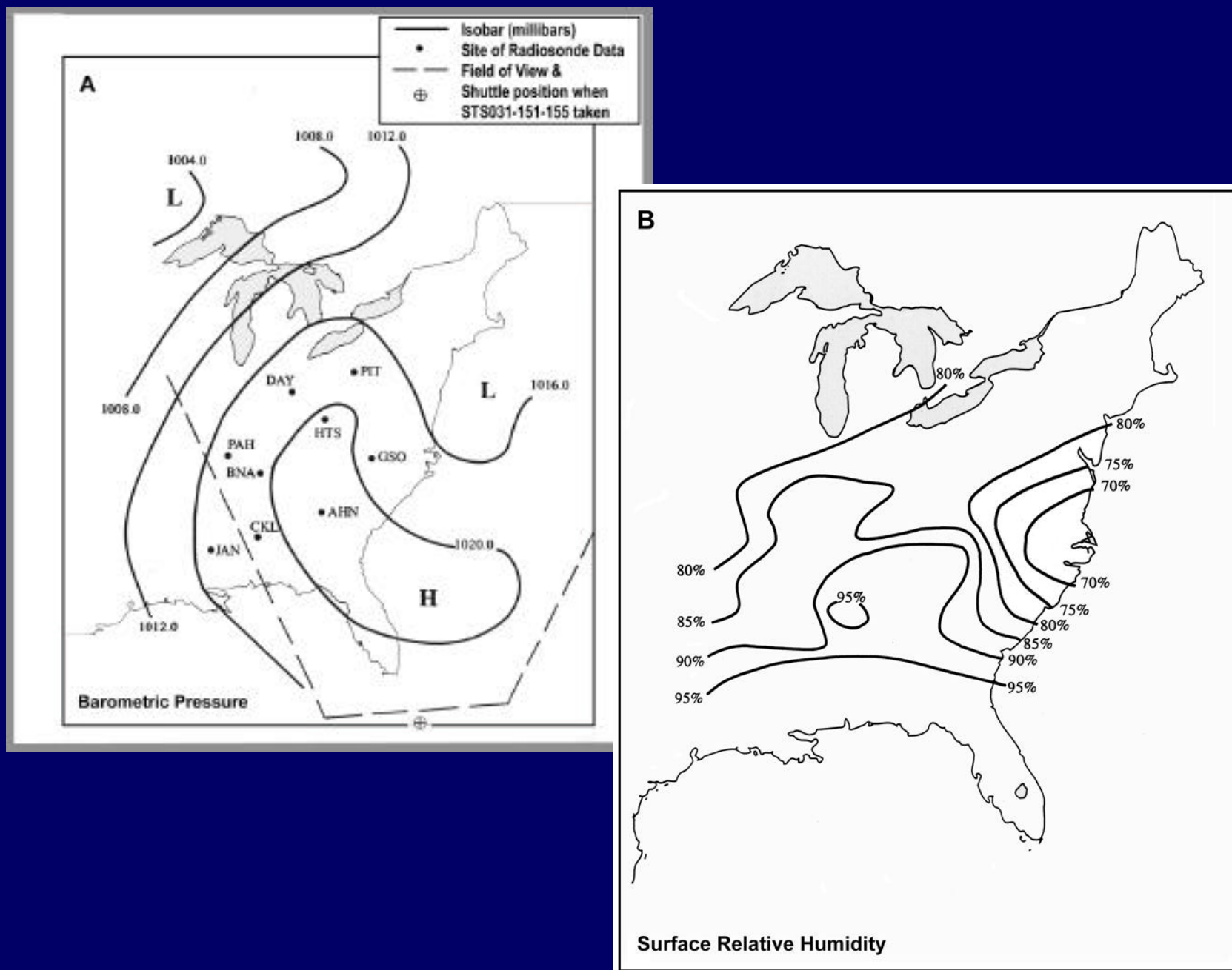


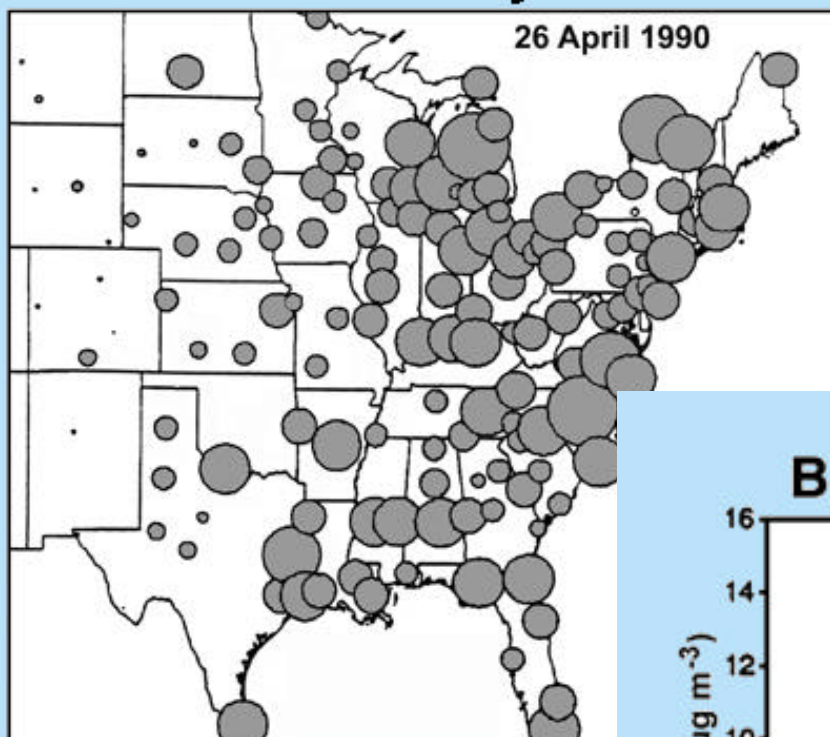
Fig. 12



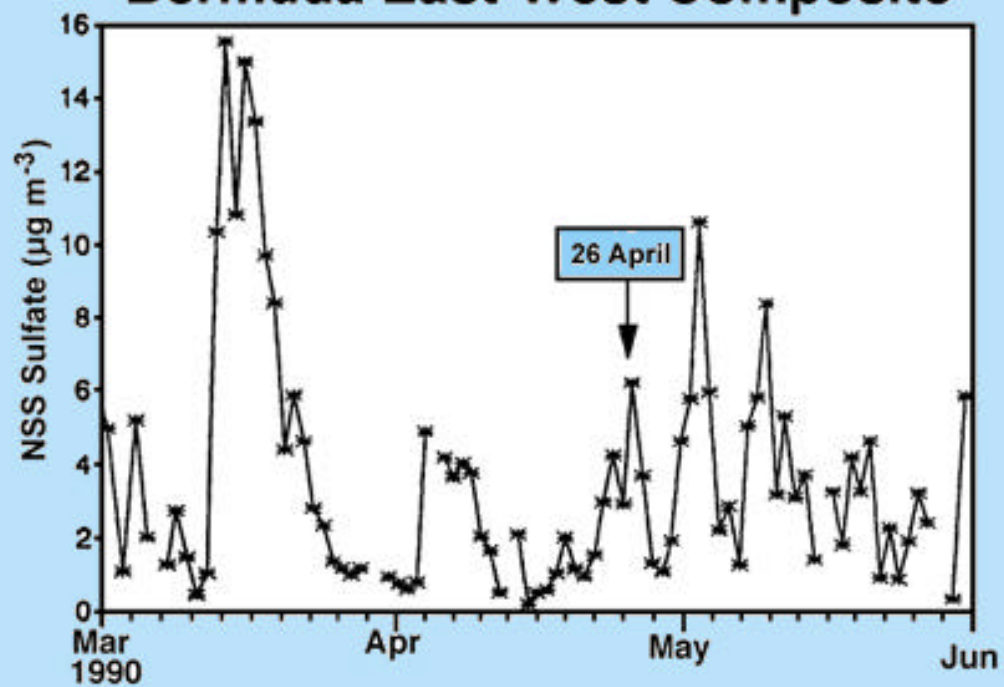




## Visibility



## Bermuda East-West Composite



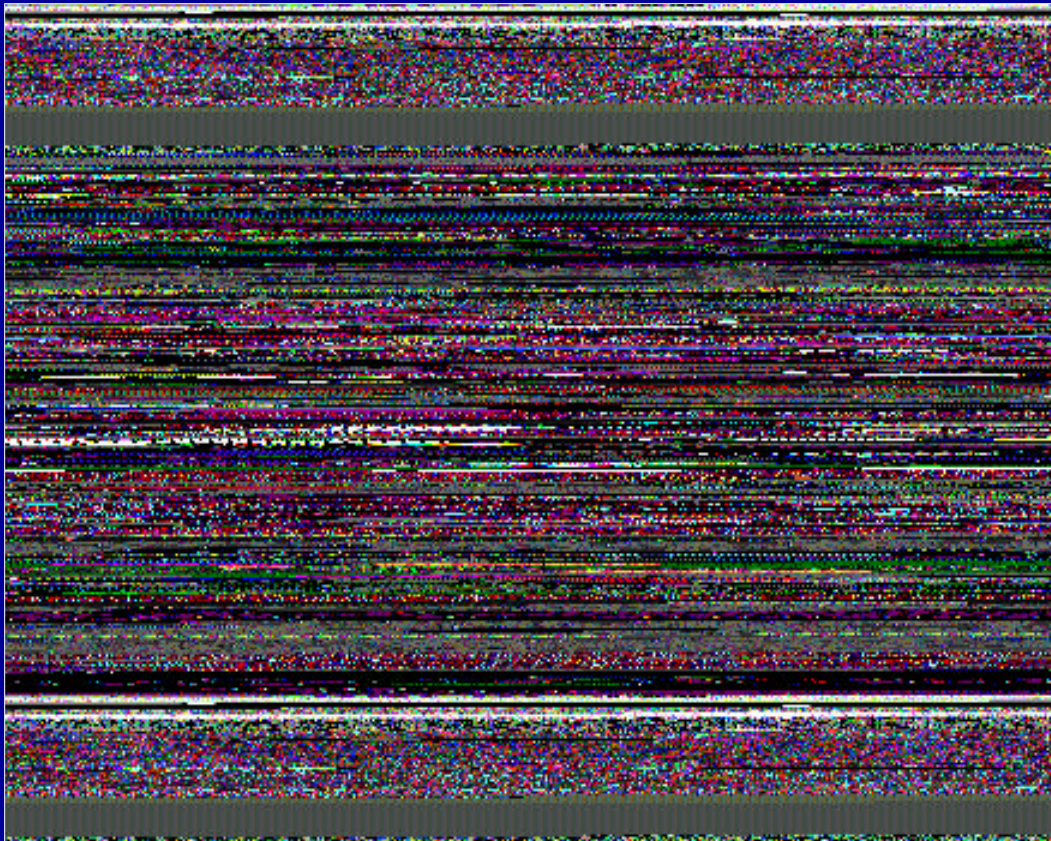
# Global Geomorphic Survey of Large Modern Non-coastal Fans ("inland deltas")

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## Rationales for examining large terrestrial fans—



*Himalayas, Tibetan Plateau, Gangetic plain—Kosi and Tista large fans*

STS73-749-91

## Large modern fans—

- have not been studied systematically
- several claimed to be possibly the “largest” or “one of the largest” on the planet
  - all exclude the largest identified in this study
  - one radius arbitrarily assigned as >100 km
- are seen as merely as large end-members of the alluvial fan continuum
- are analogs for features in the rock record

## Data sources—

- handheld photographs from Shuttle, *Mir* and International Space Station taken over most parts of the Earth 55°N - 55°S
- 1:1,000,000 ONC charts

## Characteristics—



*Kosi R. avulsions*

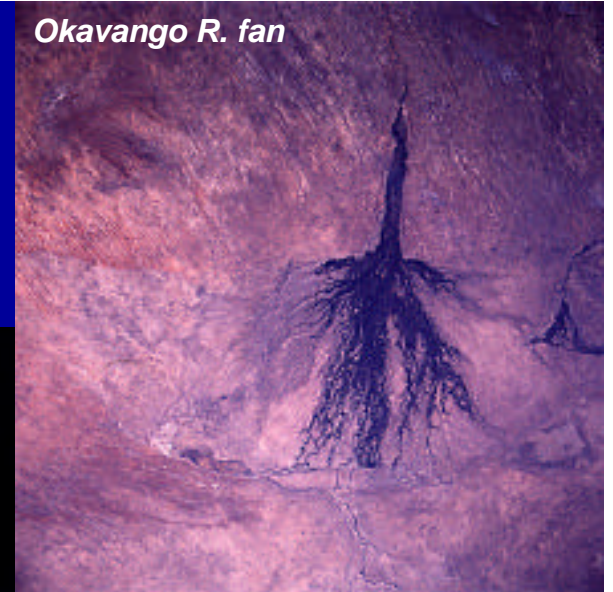
- Kosi River avulsions—
  - cover entire surface of fan
  - average rate ~19 yr between switching events
  - slowest rate encountered is > 30,000 yr between switching events



## Fan size—

- even small rivers can generate fans as large as coastal deltas of major rivers

*Okavango R. fan*



*Nile R. delta*

## Fan radius—

- Foreland basin *overflowing* produces large fan radii

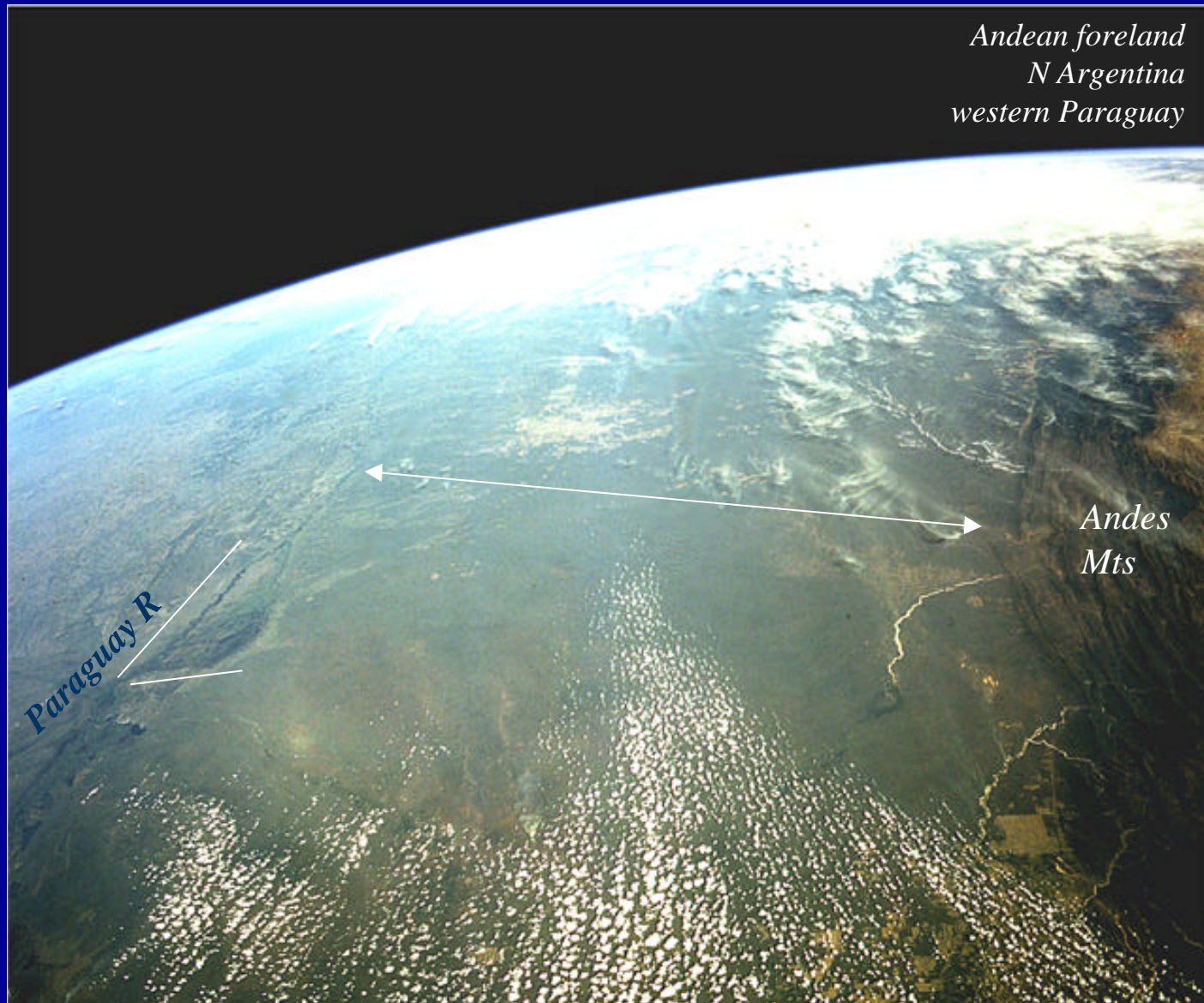
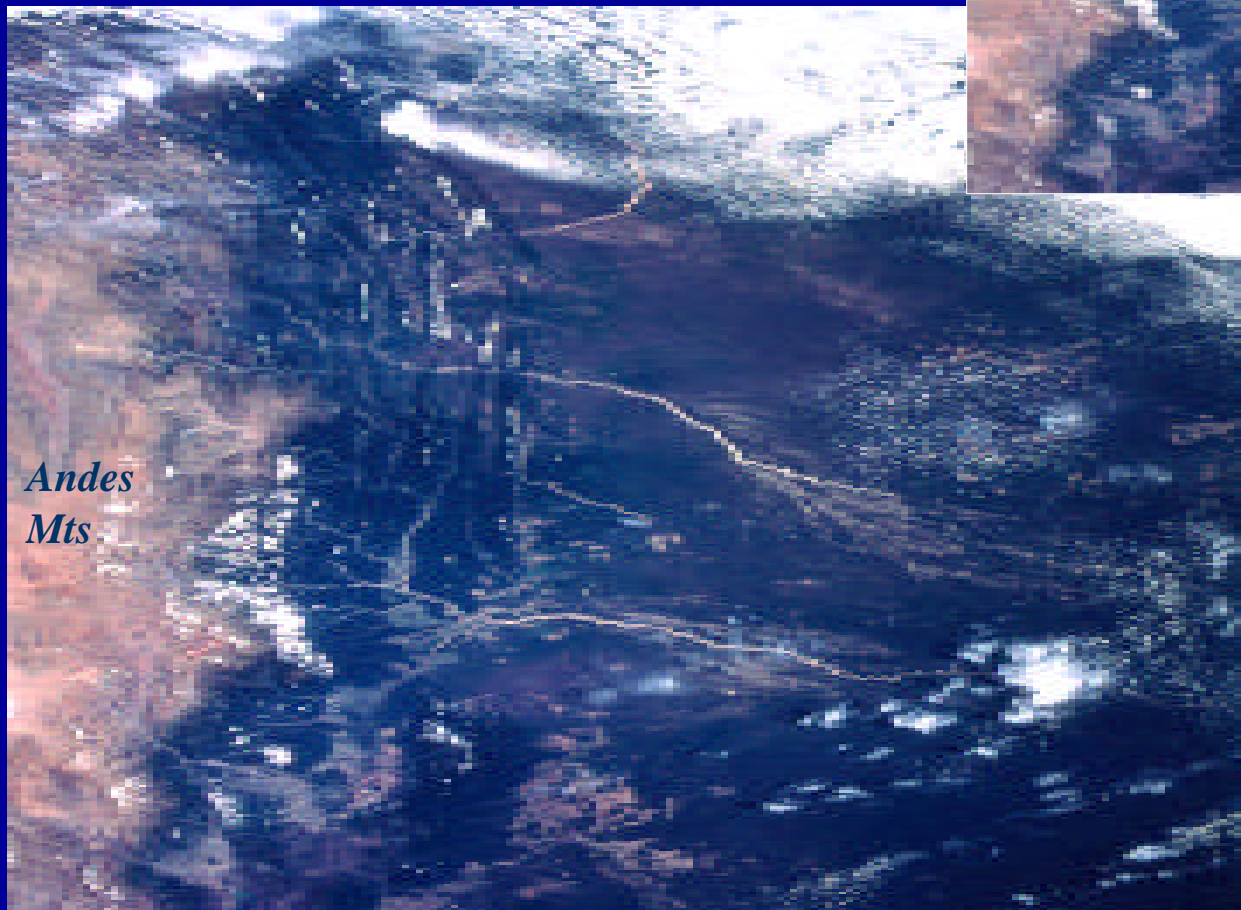


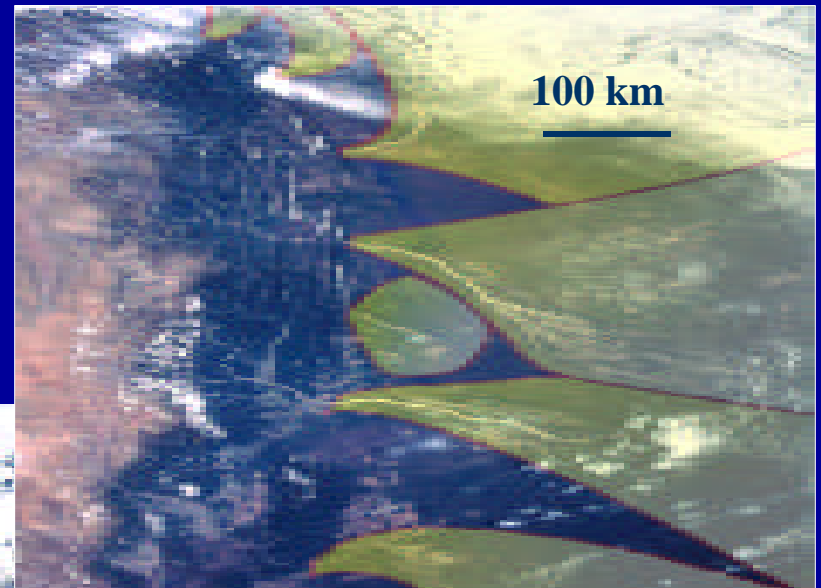
Fig. 11

## Foreland basin—nested pattern of large fans

—*contiguous* large fans cover an area of >750,000 in the Andean foreland



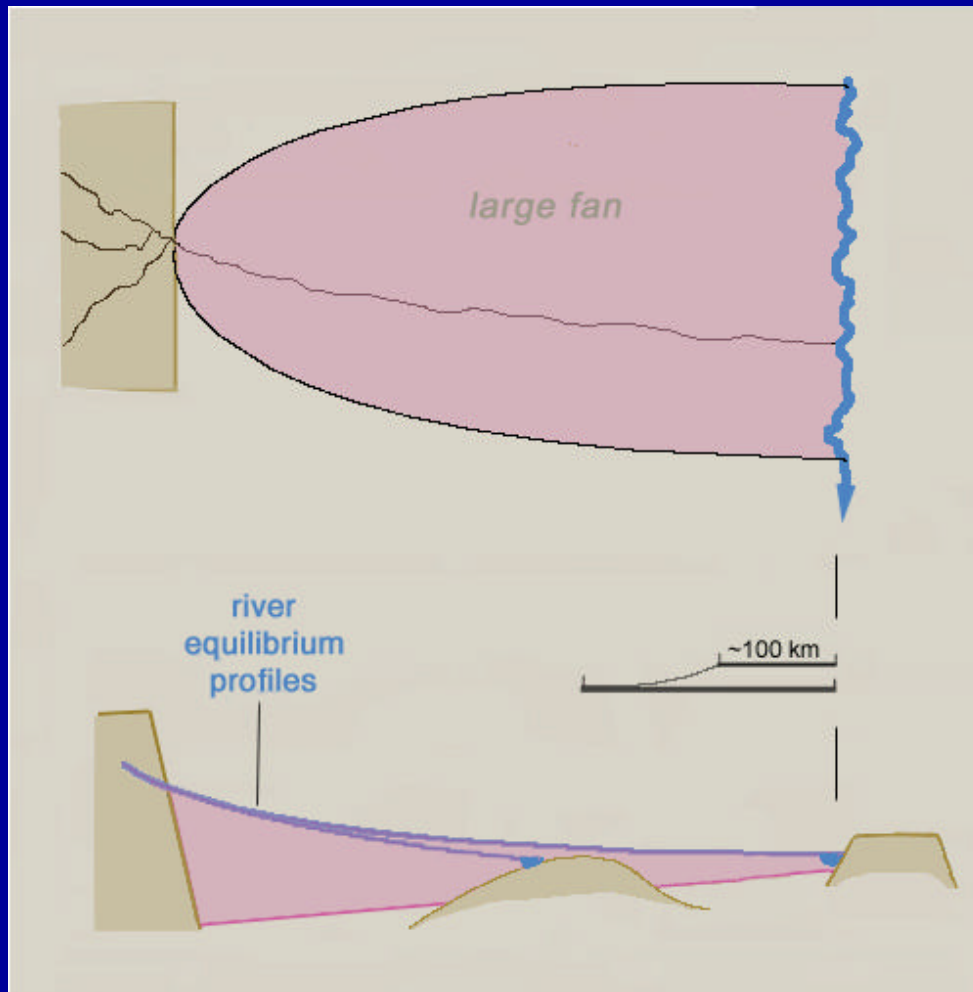
*Andes  
Mts*



100 km

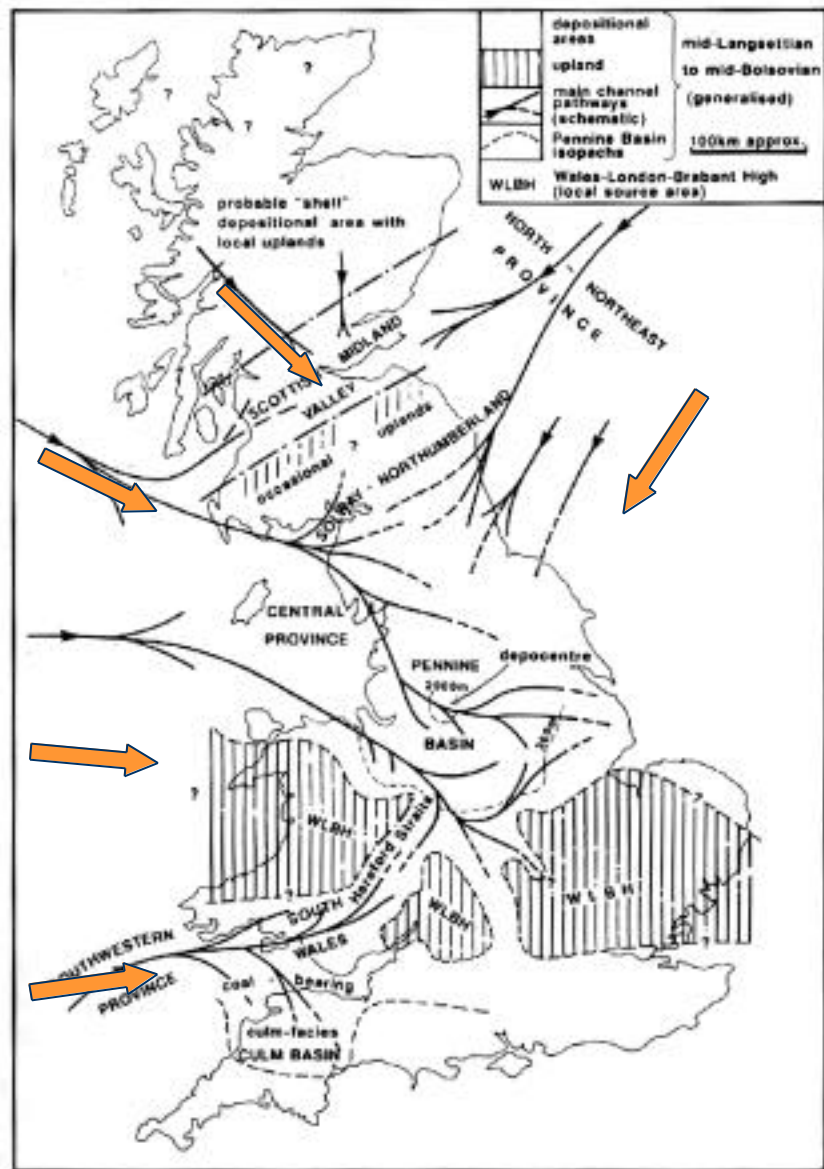
*Andes Mts  
Chaco plains—  
N Argentina  
W Paraguay*





## Fan radius—

- *river profile* is critical to fan radius, especially—
  - profile slope
  - profile altitude (incision/aggradation regime)

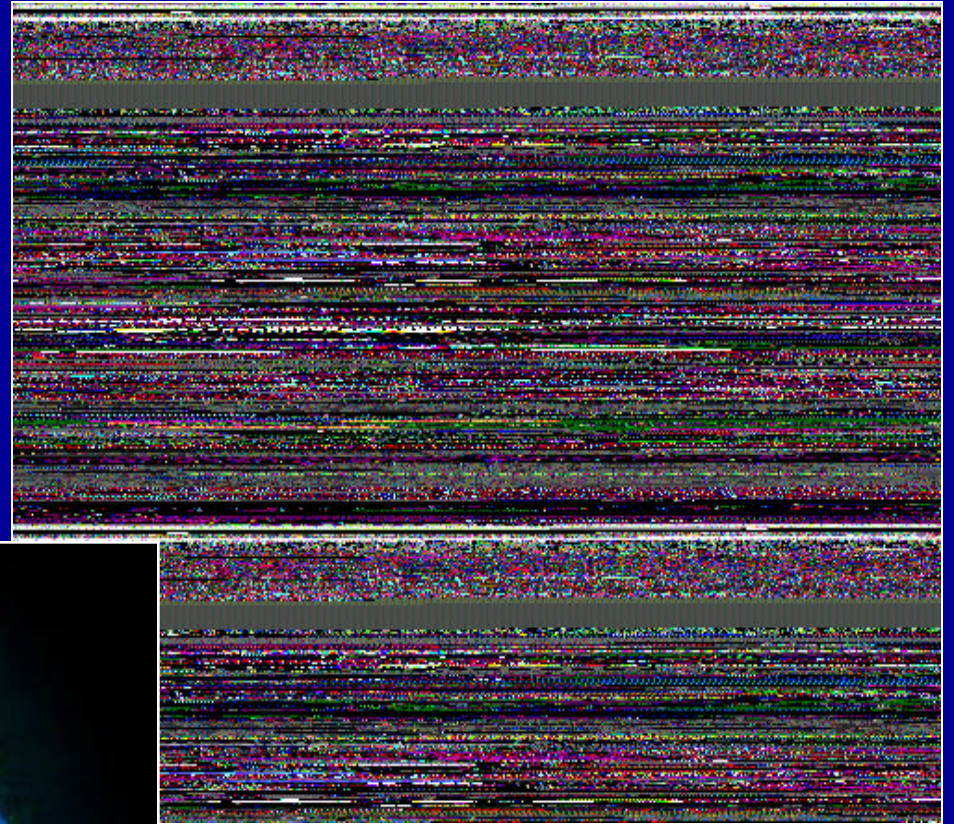


Basin paleogeography—  
interpreted from detailed mining data  
(Westphalian A & B British Isles)

- *divergent* drainage
- on a scale of hundreds of km

from  
Rippon 1996

Fish speciation and  
River switching on large fans—

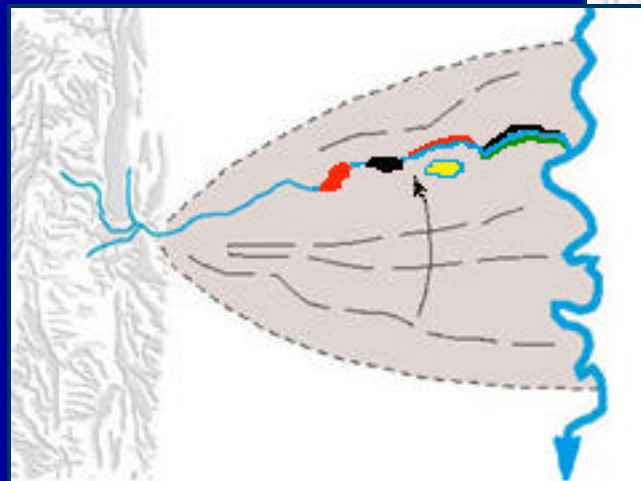
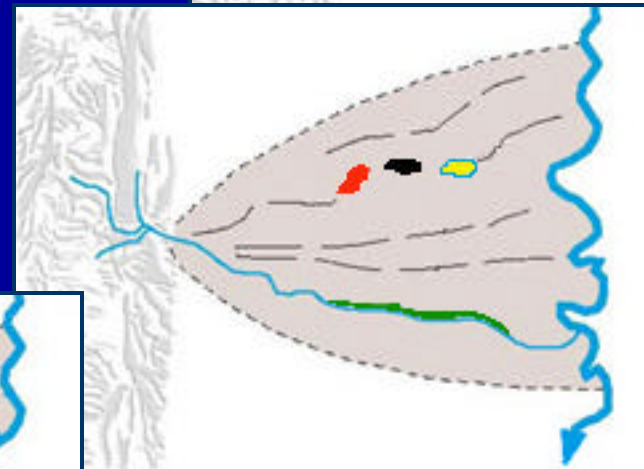
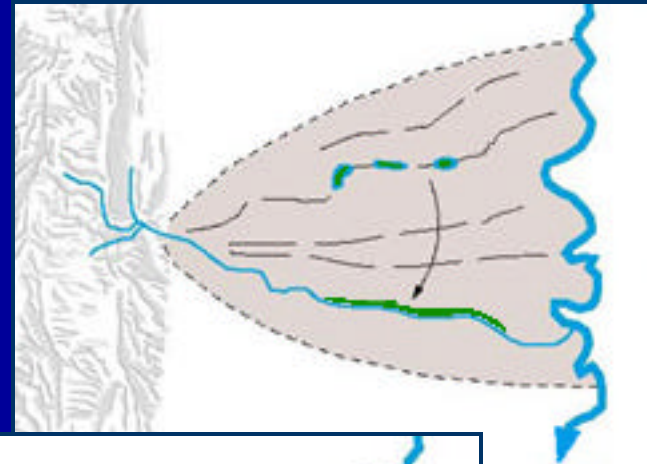




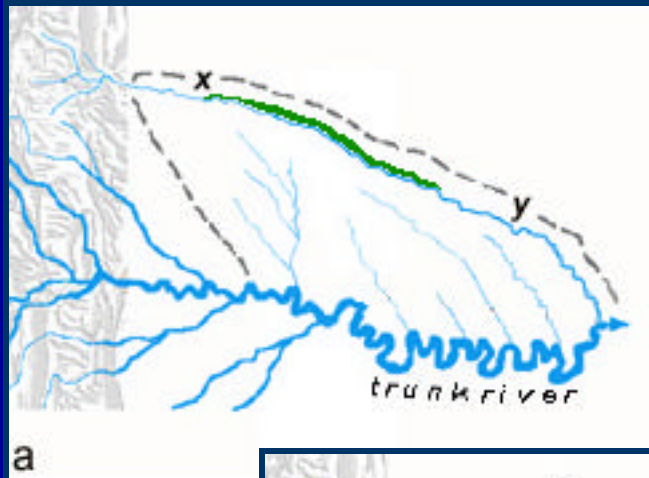
Green parent population  
speciates into—

- red
- black
- yellow

daughter species that  
reenter the regional  
drainage

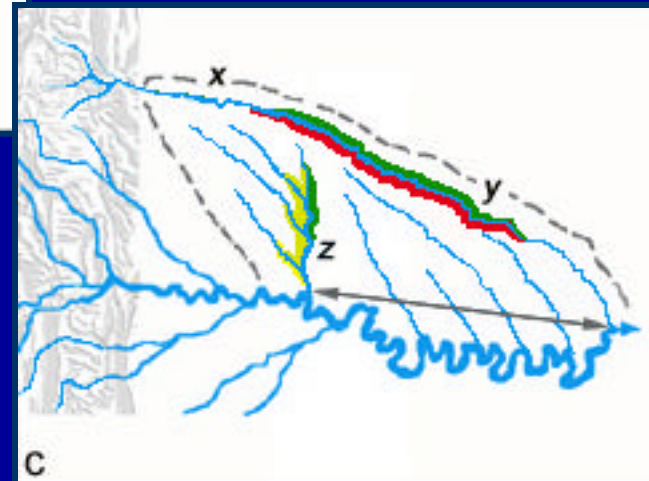
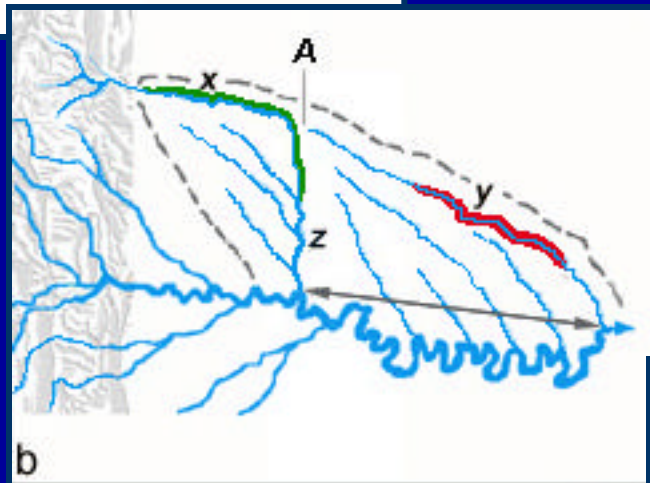


Lakes and  
river switching



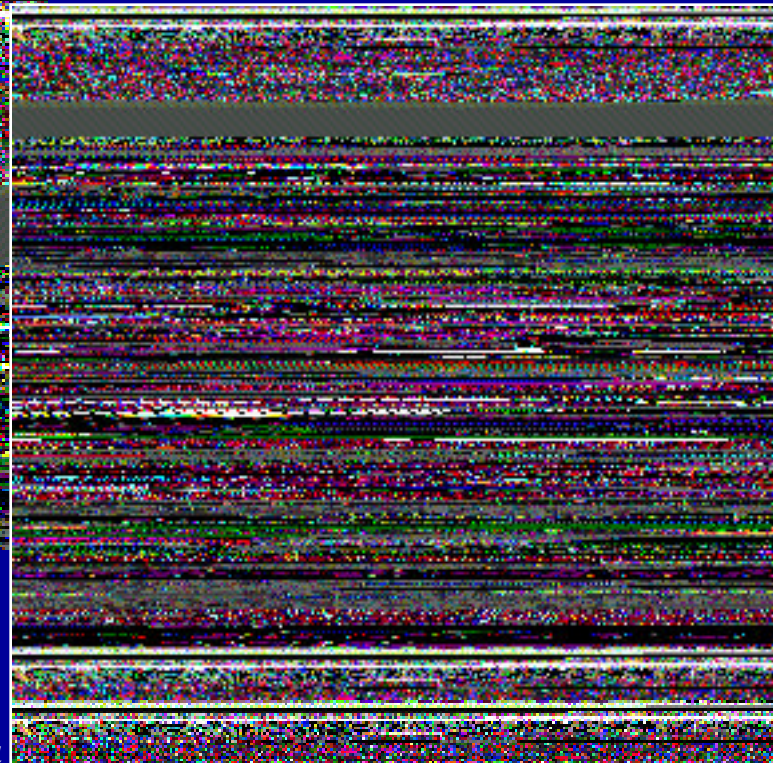
- Green parent population speciates, after river switch, into Reds

- After a second switch, the original river has Green AND Red populations



Inhospitable trunk river and river switching

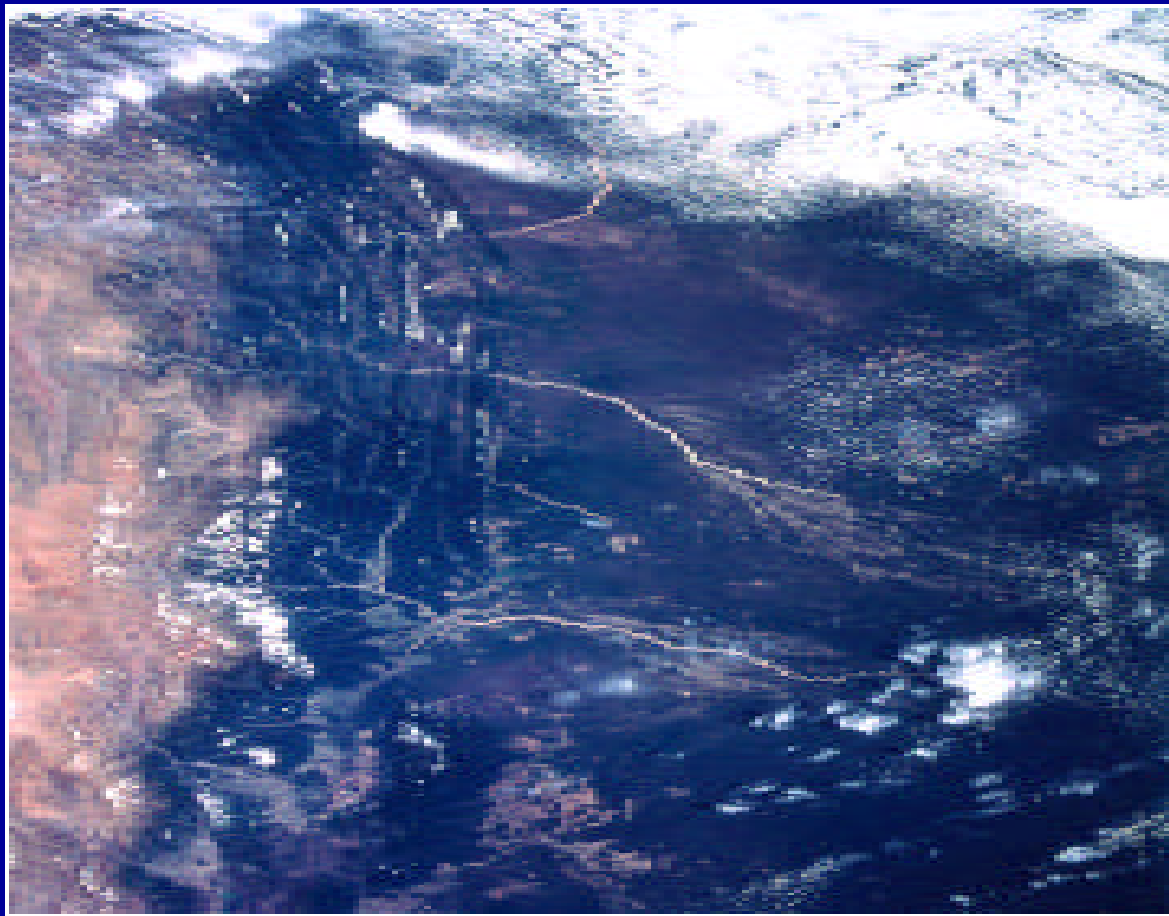
**Greens'** river is  
suddenly invaded by  
**Reds**  
from the neighboring basin



Neighboring basins and  
river switching

*Okavango fan*  
*NW Botswana*



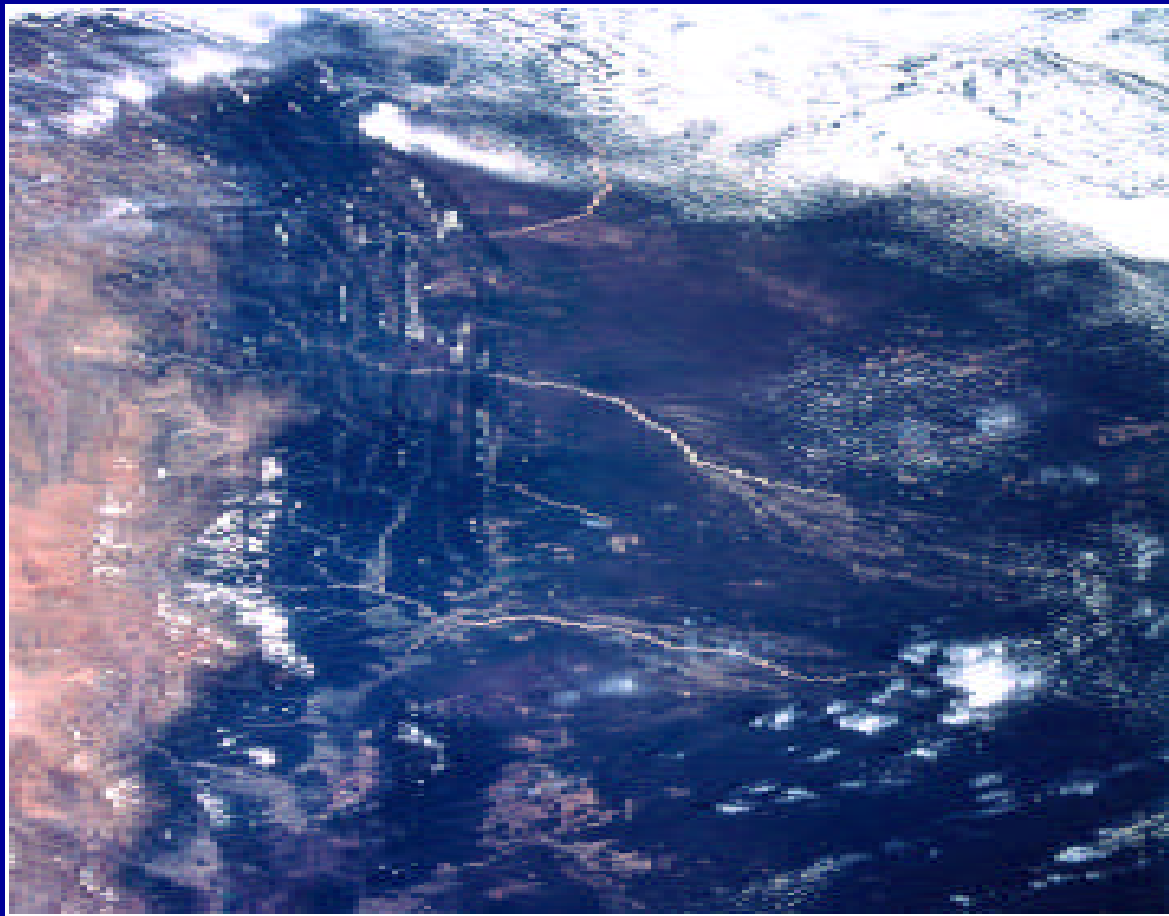


*Andes Mts*  
*Chaco plains—*  
*N Argentina*  
*W Paraguay*

## Conclusions—

Large fans (“inland deltas”) are—

- Far larger than expected
- Widespread—unexpectedly so
- Cover enormous areas of some continents



*Andes Mts*  
*Chaco plains—*  
*N Argentina*  
*W Paraguay*

## Conclusions—

Large fans (“inland deltas”) are—

- Far larger than expected
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Large fans may be the—

- dominant
- mesoscale
- depositional landform on continents

## Conclusions—

Thus, large fans are also **models** for —

- **Paleogeographies**, crucial to various disciplines, including historical geology and modeling hydrocarbon environments
- **Speciation of aquatic organisms**

